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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/730,965

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Mark M. Leather

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EXAMINER

NGUYEN, HAU H

ART UNIT

PAPER NUMBER

2628

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/730,965	<b>Applicant(s)</b> LEATHER ET AL.	
	<b>Examiner</b> HAU H. NGUYEN	<b>Art Unit</b> 2628	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 11 June 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-43 is/are pending in the application.
- 4a) Of the above claim(s) 13 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 41-43 is/are allowed.
- 6) ☒ Claim(s) 1-5, 7-12, 14-18, 20-31 and 33-40 is/are rejected.
- 7) ☒ Claim(s) 6, 19 and 32 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |                                                                                         |                                                                             |
|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____                                                |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____                                                             | 6) <input type="checkbox"/> Other: _____                                    |

### **DETAILED ACTION**

The response filed on 6/11/2008 has been fully considered in preparing for this Office Action.

#### ***Claim Rejections - 35 USC § 101***

1. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 27-39, and 43 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Although Applicant has limited the limitation "a computer program product" of claims 27-39, and 43 to "*not including carrier waves*", there is no guarantee that the "computer program product" does not include other *transport media* as indicated in the specification on page 25, lines 3-7. Therefore, the 101 rejection is maintained.

#### ***Claim Objections***

2. Claim 1 is objected to because of the following informalities: on line 9 of claim 1, the limitation "said value" is ambiguous as to what "value" it is referred to: i.e., either the resultant value on line 3, or one of the received texture values on line 7. Appropriate correction is required.

#### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are

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such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-5, 7-12, 14-18, 20-31, 33-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Donham et al. (U.S. Patent No. 6,980,209) ("Donham", herein after) in view of Storm et al. (U.S. Patent No. 5,999,196) ("Storm", hereinafter).

As per claim 1, as shown in Fig. 1, Donham teaches:

*a unified shader 30 comprising:*

*an input interface for receiving a packet from a rasterizer (col. 7, lines 12-18);*

*a shading processing mechanism configured to produce a resultant value from said packet by performing one or more shading operations, wherein said shading operation comprise both texture operations and color operations (col. 3, line 28 to col. 4, line 11, and Fig. 3, col. 7, lines 41-45), and comprising at least one ALU/memory pair (such as microblender 72, 73 and FIFO 74, Fig. 2) operative to perform both texture operations and color operations (processor 70 performs generating required averaged texel, and blending the averaged texel with the relevant value, col. 12, lines 4-32, and also Fig. 5, block diagram of the microblenders, col. 14, lines 44-62); and*

*an output interface configured to send said value to a frame buffer (In one embodiment, the pixel processor 40 in Fig. 1 can be omitted, col. 6, lines 46-47).*

Donham fails to teach the ALU/ memory pair operative to perform both texture operations and color operations, *wherein texture operations comprise at least one of: issuing a texture request to a texture unit and writing received texture values to the memory.*

However, Storm teaches a method of processing 3D graphics commands comprising, as shown in Fig. 2, a graphics accelerator 112 receiving stream of input vertex packets from the

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host 102 (col. 5, lines 3-21), and performing shading operations on the vertexes. As shown in Fig. 3, Storm teaches the shading operations comprising ALU/memory pair (floating point blocks 152s, and SRAM 153s) to perform both texture operations and color operations from the received vertex packets (which include texture and color information, col. 5, lines 17-21) (please see col. 12, lines 28-67, and elsewhere for description of the floating point processor 152), and writing received texture values to the memory SRAM 153 (see also col. 5, lines 45-54).

Therefore, it would have been obvious to one skilled in the art to utilize the method of implementing ALU/memory pair to perform both texture and color operations as taught by Storm in combination with the method of shading as taught by Donham in order to reduce the bottleneck in 3D graphics processing (col. 1, lines 49-61), and thereby improving overall graphics accelerator performance.

As per claim 2, Donham also teach *the input interface receives said packet from said rasterizer using valid-ready protocol* (i.e. the coverage value "Covg" of a packet having the FIG. 3 format indicates the extent to which the data values of a sequence of the packets are valid data, col. 9, lines 22-26).

As per claim 3, Donham further teach the output interface send said value to said frame buffer using a valid-ready protocol (*i.e. each fully processed packet is asserted to the frame buffer 50*, col. 6, lines 46-53).

As per claims 4 and 5, Donham teach *a code partition mechanism to partition code configured to instruct said shading mechanism, wherein the partitioning mechanism groups code together by level of indirection* (col. 14, line 63 to col. 15, line 23).

As per claim 7, Donham further teach a register subsystem 65 (col. 10, lines 29-33).

As per claim 8, Donham teaches the shading mechanism comprises a plurality of ALU/memory pairs to perform the shading operations (ALUs 64, 71, 84, 91/ memories 65, 74, 85, 94, Figs. 2 and 4).

As per claim 9, Donham further teaches the plurality of ALU/memory pairs constituting a single coherent memory structure synchronized by a scheduling clocking mechanism (col. 7, lines 12-35).

As per claim 10, Donham teaches the plurality of ALU/memory pairs constitute a pipeline for processing said shading operations (col. 14, line 6-20).

As per claim 11, as cited above, with reference to Fig. 2, Donham teaches said memory structure is a FIFO that does not have an associated buffer.

As per claim 12, Donham also teaches the FIFO comprises both data and operations (e.g. FIFO 74 stores packet to be processed, which includes both data and operation code, col. 11, lines 2-20).

Claims 14-18, 20-26, which relate to method claims corresponding to the apparatus of claims 1-5, 7-12 with similar scope, are thus rejected under the same rationale.

Claims 27-31, 33-39, which relate to a computer program product, *not includes carrier waves*, (see 101 rejections above), the limitations of which are similar in scope to the apparatus of claims 1-5, 7-12, are thus rejected under the same rationale.

Claim 40, which relates to a device, the limitations of which are similar in scope to the apparatus of claims 1, 8, and 9, is thus rejected under the same rationale.

***Allowable Subject Matter***

5. Claims 41-43 are allowed because claims 41-43 incorporate allowable subject matter of claims 6, 19, and 32, and are written in independent form including all of the limitations of the base claim.

6. Claims 6, 19 and 32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Reasons for Allowable Subject Matter***

7. The prior art made of record fails to anticipate or make obvious the claimed invention. Specifically, the prior art fails to teach or suggest, in combination with the remaining elements and/or step, an input state machine; a plurality of ALU state machine and a plurality of texture machines as recited in claims 6, 19 and 32.

***Response to Arguments***

Applicant's arguments filed 6/11/2008 have been fully considered but they are not persuasive.

In response to Applicant's arguments that the cited reference Donham fails to teach the ALU/ memory pair operative to perform both texture operations and color operations, the examiner respectfully disagrees. In fact, as cited above, in the rejection, the examiner cited the microblenders 72 and 73 comprising an ALU/memory pair, wherein, for example as shown in Fig. 4 or 5, the microblender comprising execution /math (104/105) –fifo (106) pair, and wherein

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*each* microblender, such as one in Fig. 5, perform *both* texture operations and color operations on the received packet (see col. 14, line 63 through col. 15, line 24).

In response to Applicant's arguments that the cited reference Storm fails to teach the ALU/ memory pair operative to perform both texture operations and color operations, *wherein texture operations comprise at least one of: issuing a texture request to a texture unit and writing received texture values to the memory*, the examiner also respectfully disagrees. Storm is cited as a secondary reference in combination with Donham to disclose this feature. In fact, on col. 12, lines 63-67, Storm teaches the floating point processor includes an S-core block (Fig. 6), wherein:

The S-core block performs setup calculations for all primitives. These set-up calculations involve computing the distances in multiple dimensions from one vertex to another and calculating slopes along that edge. For triangles, the slopes of the Z depth, the *color*, and the UV (*for texture*) are also computed in the direction of a scan line.

And on col. 5, lines 12-21,

Each input vertex packet may contain any combination of three dimensional vertex information, including vertex position, vertex normal, *vertex color*, facet normal, facet color, *texture map coordinates*, pick-id's, headers and other information.

Thus, in order for the S-core block to perform the setup calculation, a request to a texture unit should be placed and stored at least temporarily. One such request is when a pixel is read back via the command block from the draw engine 172 (a texture unit, as considered by Applicant) as shown in Fig. 10 (see col. 20, lines 13-60). Also from the cited paragraphs above, the floating point processors do perform texture operation, at least with texture addresses.

Storm further does teach shading processing mechanism because the floating point processors also includes an L-core block 354 *performs substantially all lighting calculations using onchip RAM-based microcode* (see col. 12, lines 50-61). Donham, as cited above, also



teaches a pixel shader 30, see Fig. 2. Therefore, Applicant's assertion that there is no shading processing mechanism in the cited reference is incorrect.

For at least the reasons given above, Storm in combination with Donham meets the minimum requirements of the claims, and thus, rejection is maintained.

### ***Conclusion***

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hau H. Nguyen whose telephone number is: 571-272-7787. The examiner can normally be reached on MON-FRI from 8:30-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kee Tung can be reached on (571) 272-7794.

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The fax number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Hau H Nguyen/

Examiner, Art Unit 2628

/Kee M Tung/

Supervisory Patent Examiner, Art Unit 2628